Central Indiana Summer 2016 Summary

The summer of 2016 ended up warmer and wetter than normal for many locations, and was the warmest summer since the very hot summer in 2012. The Indianapolis International Airport made it to 90 degrees on 27 days throughout the summer, nearly matching all of the 90 degree days from 2013, 2014 and 2015 combined. Maybe more impressive, the lows remained at or above 70 degrees on 37 nights through the summer, tying the summer of 2010 as the most experienced in Indianapolis since the 39 nights during the summer of 1983. 20 of those nights occurred in August this year, a new record for that month.

The summer will go down as one of the wettest on record for many areas, though not as wet as last summer. Frontal boundaries became consistently bogged down across the region throughout the summer, with many locations receiving in excess of 5 inches for each month. August in particular was exceptionally wet across much of central Indiana, especially northern and eastern portions of the region. In addition to the rain and storms, central Indiana experienced two separate but significant tornado outbreaks in August, including the August 24 event which produced the EF3 tornado in Kokomo.

The following is a summary of weather conditions experienced in Central Indiana during the months of June, July, and August 2016.

Temperatures

The summer of 2016 was tied for the **15th warmest summer ever at Indianapolis**, with an average temperature of 76.4 degrees. The normal summer average temperature is 73.9 degrees, making this summer above normal by 2.5 degrees. Average temperatures across central Indiana for the summer generally ranged 2 to 3 degrees above normal.

June

June 2016 was the warmest June since 2012, with most of central Indiana experiencing temperatures averaging 2 to 4 degrees above normal. At Indianapolis, eight days saw temperatures rise to 90 degrees or warmer, more than any other June over the last 20 years except the memorable hot June of 2012.

Temperatures were near to slightly below normal through the first week of the month with highs ranging from the middle 70s to middle 80s and lows ranging from the 50s into

the lower and middle 60s. The first really hot stretch of the season arrived beginning on the 10th and continued for the most part through the 15th as highs frequently rose into the lower 90s with a humid airmass as well. Highs remained largely above 80 degrees through much of the rest of the month. The expansion of an upper level trough into the Ohio Valley on the 28th brought a cooler and much less humid airmass to end the month with highs primarily in the 70s and morning lows in the 50s.

July

The presence of a pesky upper level low that spread clouds and scattered showers across the Ohio Valley led to a cool start to the month. Highs generally remained under 80 through the 4th, with several locations not able to get out of the 60s on the 3rd. The high of 76 at Indianapolis on July 4 made for one of the cooler Independence Days on record and coolest since 2009 when the high was only 70 degrees.

Temperatures returned to more typical levels for July beginning on the 5th and continuing through the following one to two weeks with highs primarily in the mid and upper 80s and lows generally in the mid and upper 60s. The warmest stretch of weather through the month commenced on the 21st and continued into the last week of the month. Many areas experienced five to six consecutive days with highs at or above 90 degrees. High humidity levels produced heat indices at or above 100 degrees throughout the heat wave as well.

Indianapolis made it into the 90s on seven days throughout the month, the most 90 degrees days in July since the very hot July in 2012. Indianapolis also had a streak that lasted nearly 11 consecutive days from the 18th through the 28th where temperatures never fell below 70 degrees. This was the longest streak of temperatures at or above 70 degrees since the 22 day stretch from June 28 through July 19 in 2012.

August

August was the warmest month for many since 2010 as heat and humidity consistently impacted the Ohio Valley. August began warm and dry with many locations above 90° on multiple days during the first week of the month. Temperatures remained warm as the weather pattern became more active, with several locations experiencing their hottest day of the month and summer on either the 10th or 11th. A deep plume of tropical moisture interacted with a frontal boundary to produce heavy rain and widespread thunderstorms on the 13th through the 16th, resulting in cooler days with highs struggling to rise out of the 70s. Temperatures recovered to normal levels in the 80s for a few days before another cold front passing on the evening of the 20th, ushering in a cooler, drier and much less humid airmass for the region. Highs in the upper 70s

and lower 80s were common from the 21st through the 23rd. A much more active and more humid weather pattern returned for most of the last week of the month, with highs once again warming into the upper 80s and lower 90s.

Warm overnights were common throughout the month as well, with 20 of the 31 mornings staying at or above 70 degrees in Indianapolis. This set a new record for the number of 70°+ lows in August, besting the previous mark of 19 days in both August 1900 and 1995. Many areas saw only 1 or 2 mornings below 60° the entire month. For Indianapolis, only the 22nd saw a low temperature fall below 60°, the lowest number of days since August 2007. The 12 90°+ days at Indianapolis matched August 2011 for the most days at or above 90° in recent history, and most since the 16 days in August 2010. Ultimately, this made for a warm finish to a warm summer in central Indiana.

Temperature Data for Other Sites in Central Indiana

Site	Summer 2016 Temperature	Normal Temperature	Diff. From Normal
Indianapolis Int'l Arpt	76.4	73.9	**+2.5**
Lafayette	73.7	73.1	**+0.6**
Muncie	75.5	72.8	**+2.7**
Terre Haute	76.2	73.4	**+2.8**
Bloomington	75.4	72.8	**+2.6**
Shelbyville	76.2	72.7	**+3.5**
Indianapolis – Eagle Creek	76.5	73.9	**+2.6**

Summer Extremes Across Central Indiana

Site	Warmest Temperature	Coldest Temperature
Indianapolis Int'l Airport	93 on 8/11	51 on 6/8
Lafayette	93 on 6/10 and 6/11	46 on 6/8
Muncie	94 on 7/24	50 on 7/2
Terre Haute	94 on 6/11 and 6/12	50 on 6/8
Bloomington	93 on 6/12	50 on 7/2
Shelbyville	95 on 6/11	50 on 7/2

Indianapolis-Eagle Creek	93 on 7/24	52 on 7/2

Rainfall

Overall this was the **7th wettest summer on record at Indianapolis.** The total rainfall for Indianapolis this summer was 17.51 inches. The normal rainfall total for summer is 11.93 inches, which made this summer in Indianapolis above normal by 5.58 inches. Rain was evenly distributed throughout the summer, with the second half of the summer seeing wetter conditions and more frequent storms.

June

Monthly rainfall during June varied widely across the state. Totals ranged from around an inch in portions of Lake and Porter Counties in northwest Indiana to more than 10 inches in a small area of Fayette County in east central Indiana. Rainfall was below normal in northwest and in portions of southwest and northeast Indiana. Much of the remainder of the state received near normal to above normal precipitation. Many areas received between 2 and 6 inches of rain in June.

Precipitation during June favored much of central, south central, southeast and portions of northeast Indiana. Rainfall of an inch or more fell on 9 days at some location in the state. None of the rain events during June provided complete areal coverage. Only localized flooding followed the heavier rain events of the 15th, 20th and 23rd.

Rainfall during the first half of June varied from less than an inch in a sizeable portion of northern Indiana and small areas of southwest Indiana to over 6 inches in small portions of central and east central Indiana. Rainfall during the last half of June continued to fall in many of the same areas as the first half. Precipitation totals varied from less than a quarter of an inch in portions of southwest Indiana to over 4 inches in central and parts of northeast Indiana.

At the end of June, the U.S. Drought Monitor indicated abnormally dry conditions in northwest Indiana and pockets of north central, east central, southwest and south central Indiana. This totaled nearly 20 percent of the state.

July

Once again monthly rainfall during July varied widely across the state. July 2016 was among the driest Julys of record for northeast Indiana and among the wettest Julys for portions of southern Indiana. Monthly totals ranged from slightly over an inch in northeast Indiana to more than 12 inches southern Indiana.

Rainfall was generally normal to above normal in western, central and southern Indiana where most areas received 4 to 10 inches for the month. Much of north central, northeast and east central portions of the state were drier than normal where many locations received only 1.5 to 4 inches of rainfall during July.

Heavy rainfall was frequent during July. Daily rainfall of an inch or more of rain occurred somewhere in the state on more than 16 days of the month. The longest state wide dry spell was from the 9th through the 11th and lasted less than 4 days.

There were several areal or flash flood events during July following 3 inches or more of rainfall. These include the 3rd and 4th in southwest Indiana, the 13th and 14th in west central Indiana, the 18th in west central and central Indiana, the 26th and 28th in southern Indiana and the 29th in central Indiana. The East Fork White River approached flood stage during the morning of the 27th after 3 to more than 5 inches of rainfall in southeast Bartholomew, southern Decatur and northern Jennings Counties during the 26th.

At the end of July, abnormally dry conditions persisted in portions of northeast and east central Indiana. This totaled about 10 percent of the state

August

August 2016 was the wettest August of record for many areas of Indiana. This included the South Bend area and most locations in northwest and north central Indiana, the northeast and eastern portions of the Indianapolis metropolitan area, and the Vincennes, Bloomington, Columbus and Batesville areas in southern Indiana. Rainfall in these areas totaled more than 10 inches.

The driest areas of the state included northeast Indiana and southwest and south central Indiana immediately north of the Ohio River. Precipitation totals in these areas ranged from 2 to 3 inches. The remainder of Indiana received between 4 and 8 inches during August.

Rainfall varied widely between local communities as well as across the state. In the immediate Indianapolis metro area monthly amounts ranged from slightly more than 3 inches in northwest Hamilton County to more than 11 inches in northeastern Marion and eastern Hancock Counties. Monthly totals in Indiana ranged from slightly over 2 inches in northeast and southwest Indiana to more than 13 inches in northwest Indiana.

Areal and flash flood events during August were frequent in the state between the 13th and 28th. The more noteworthy events occurred on the 13th in southwest Indiana, on the 15th in the South Bend area, on the 24th in central Indiana, on the 26th in the Indianapolis area, and on the 28th in the Muncie area.

Rainfall of 6 to more than 8 inches from the 13th through the 15th caused lowland river flooding along the White River in southwest Indiana and the East Fork White and Muscatatuck Rivers in Jackson County. Flood crests ranged from slightly over flood stage to 3.5 feet above flood stage. Flooding lasted from 2 to 4 days.

At the end of August, many areas remained on the wet side. Abnormally dry conditions in northeast Indiana totaled less than 10 percent of the state.

Rainfall Data for Other Sites in Central Indiana

Site	Summer 2016 Rainfall	Normal Rainfall	Diff. From Normal
Indianapolis Int'l Arpt.	17.51	11.93	**+5.58**
Lafayette	15.23	11.53	**+3.70**
Muncie	15.21	12.34	**+2.87**
Terre Haute (*)	13.18	12.84	**+0.34**
Bloomington	17.32	13.30	**+4.02**
Shelbyville	16.65	12.50	**+4.15**
Indianapolis – Eagle Creek	20.52	11.84	**+8.68**

(*) – Terre Haute missing precipitation data for 6/3, 6/4 and 8/15.

Major Weather Events

June

There were a few severe weather events that impacted central Indiana throughout June. Severe storms developed during the afternoon and evening of the 15th producing wind damage with gusts of 60 to 65 mph measured in multiple locations and large hail across much of central Indiana near and south of Interstate 70. Scattered strong to severe storms impacted areas near and north of Interstate 70 during the evening of the 20th.

The largest severe weather event of the month occurred during the late evening of the 22nd and early morning of the 23rd as a line of intense thunderstorms producing high winds moved southeast across the northern half of central Indiana. Wind gusts were measured at 100 mph north of Lafayette with an 82 mph wind gust in Russiaville. The most widespread wind damage occurred from Tippecanoe and Carroll Counties southeast through western Howard, eastern Clinton and Tipton counties. Additional wind damage occurred across the northern and eastern Indianapolis suburbs.

July

Scattered strong to severe thunderstorms impacted parts of central Indiana throughout the month of July. The biggest severe weather event of the month occurred during the afternoon and evening of the 13th as a series of upper level disturbances interacted with

a very moist and unstable airmass over the region. Storms produced damaging winds, large hail up to golf ball size and heavy rainfall from mid afternoon through the evening. Winds gusted to 61 mph at Indianapolis International Airport as the storms came through the metro area. For more information on this event, please visit **http://www.weather.gov/ind/jul132016severe**.

August

After a quiet start, August became active for severe weather across central Indiana and the entire Hoosier state for much of the second half of the month. It was a historical month for tornadoes as two separate outbreaks impacted the state, setting a record for most tornadoes ever in August at 18.

The first outbreak occurred on August 15, as a supercell moved from Hendricks County northeast through Boone, Hamilton, Tipton and finally Howard County, producing multiple tornadoes along its track. Six tornadoes in all occurred with this supercell, the strongest producing EF2 damage near Whitestown in Boone County. In addition, two additional tornadoes occurred, one near Lafayette and the other in Avon. The eight tornadoes from the event became a daily record for August tornadoes in Indiana, briefly. For more information on this event, please click the following link http://www.weather.gov/ind/aug152016severe.

That record would last for all of 9 days, as a larger and more intense tornado outbreak impacted the state on the afternoon and evening of the 24th. Multiple supercells produced tornadoes across central and northern Indiana, the strongest being an EF3 that caused extensive damage in Kokomo and an EF3 near Woodburn east of Fort Wayne. The epicenter of the outbreak was Howard County which saw at least four separate tornadoes, including the EF3 in Kokomo. In all, 10 tornadoes occurred across the state on the 24th, becoming the new record for daily tornadoes in August in Indiana and only the 17th day with 10 or more tornadoes in state history. For more information on this event, please click the following link http://www.weather.gov/ind/aug242016severe.

Additional severe weather occurred at various times throughout the second half of the month with wind damage and hail. A storm impacted the Indianapolis metro area during the tail end of rush hour on the morning of the 26th, producing wind damage and an impressive shelf cloud.

Fall 2016 Outlook for Central Indiana

The official outlook for the 2016 fall season (September-November) from the Climate Prediction Center indicates a greater chance of above normal temperatures and an equal chance of above, near or below normal precipitation across central Indiana. At

Indianapolis, the average temperature for the fall season is 55.2 degrees. At Indianapolis, the average precipitation for the fall season is 9.94” and 1.1” of snowfall.

Data prepared by the NWS Indianapolis Climate Team
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